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| APPLICATION NO.                                           | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------------------------------------------------|-------------|----------------------|---------------------|------------------|
| 10/706,097                                                | 11/12/2003  | Ci-Ling Pan          | 59629-8012.US01     | 6504             |
| 22918                                                     | 7590        | 08/03/2006           | EXAMINER            |                  |
| PERKINS COIE LLP<br>P.O. BOX 2168<br>MENLO PARK, CA 94026 |             |                      | NGUYEN, HOAN C      |                  |
|                                                           |             |                      | ART UNIT            | PAPER NUMBER     |
|                                                           |             |                      | 2871                |                  |

DATE MAILED: 08/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/706,097             | PAN ET AL.          |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | HOAN C. NGUYEN         | 2871                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 15 May 2006.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 4-7 and 9 is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-3, 8 and 10-14 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                                                         |                                                                             |
|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | Paper No(s)/Mail Date. _____.                                               |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|                                                                                                                         | 6) <input type="checkbox"/> Other: _____.                                   |

## DETAILED ACTION

### *Response to Amendment*

Applicant's arguments with respect to claim 1-3, 8 and 10-14 based on the Response filed on 5/15/2006 have been considered but are in the same ground(s) of rejection. Therefore, this is Final action.

This application contains claims 4-7 and 9 drawn to an invention nonelected with traverse on 11/17/2005. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim et al. (US5184233A) in view of Lim et al. (Appl. Phys. Lett. 62 (10), 8 March 1993).

Regard to claim 1, 10-13, Lim et al. (US5184233A) disclose a phase shifter based on magnetically controlled birefringence in liquid crystal, the phase shifter comprising:

- a magnetic field generating mechanism with adjustable direction (col. 6 line 64 to col. 7 line 2), the magnet can be rotated around an axis to provide a magnetic field of adjustable direction, thus change the orientation of the liquid crystal molecules in a liquid crystal cell;
- a liquid crystal cell through which the wave propagates, the corresponding reflective refraction index of the liquid crystal will be changed according to the angle of the magnetic field, the equivalent optical path of the wave is also changed, thus providing a continuously adjustable phase shift;

wherein

Claims 2-3 and 12-13:

- said direction-adjustable magnetic field mechanism further comprising other shapes and configuration of permanent magnets capable generating adjustable magnitude and direction of said magnetic field.

However, Lim et al. (US5184233A) fails to disclose the liquid crystal cell through which the THz wave propagates.

Lim et al. (Appl. Phys. Lett. 62 (10), 8 March 1993) disclose the liquid crystal cell through which the THz (or millimeter wave has a frequency of 300 GHz = 0.3 THz in a range of 0.1-10THz of sub-millimeter as defined in abstract of the instant application) wave propagates.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a the phase shifter as Lim et al. (US5184233A) disclosed with the liquid crystal cell through which the THz (or millimeter) wave propagates for commercial and application purposes.

2. Claims 1-3, 8, and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim et al. (US5184233A) in view of Masaki Tanaka et al. (Japanese Journal of Applied Physics, Part 1, Vol. 39, , Number 11, pp. 6393-6396.).

Regard to claim 1, 10-13, Lim et al. (US5184233A) disclose a phase shifter based on magnetically controlled birefringence in liquid crystal, the phase shifter comprising:

- a magnetic field generating mechanism with adjustable direction (col. 6 line 64 to col. 7 line 2), the magnet can be rotated around an axis to provide a magnetic field of adjustable direction, thus change the orientation of the liquid crystal molecules in a liquid crystal cell;
- a liquid crystal cell through which the wave propagates, the corresponding reflective refraction index of the liquid crystal will be changed according to the angle of the magnetic field (col. 1 lines 20-39, col. 2 lines 6-44), the equivalent optical path of the wave is also changed, thus providing a continuously adjustable phase shift;

wherein

Claims 2-3 and 12-13:

- said direction-adjustable magnetic field mechanism further comprising other shapes and configuration of permanent magnets capable generating adjustable magnitude and direction of said magnetic field.

However, Lim et al. (US5184233A) fails to disclose the liquid crystal cell through which the THz wave propagates (claims 1 and 10) and said comprising the alignment of the liquid crystal molecules which are parallel to the substrate (claims 8 and 14).

Masaki Tanaka et al. disclose the liquid crystal cell through which the THz (or millimeter) wave propagates and comprising the alignment of the liquid crystal molecules which are parallel to the substrate (Figs. 3 and 6 describe the transmission properties of LC cells with rubbing direction parallel to  $E_{MMW}$ , which is parallel to substrates Fig. 5a).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a the phase shifter as Lim et al. (US5184233A) disclosed with (a) the liquid crystal cell through which the THz (or millimeter) wave propagates for commercial and application purposes such as small size, low cost, low lost and low power consumption: and (b) the liquid crystal cell comprising the alignment of the liquid crystal molecules which are parallel to the substrate for typical weak dispersive effect in the MMW region as Masaki Tanaka et al. taught.

***Response to Arguments***

Applicant's arguments filed on 5/15/2006 have been fully considered but they are not persuasive.

**Applicant's ONLY arguments are follows:**

Lim et al. (US5184233A), KC Lim (APL 62(10) 1993) and Masaki teach "a terahertz shifter", "a liquid crystal through which the THz wave propagates", "thus providing a continuously adjusting phase shift" and "said magnetic field with adjustable direction and magnitude changes said reflective refraction index of said liquid crystal cell and an equivalent optical path of said THZ wave".

**Examiner's responses to Applicants' ONLY arguments are follows:**

The language "“a terahertz shifter” considers as Preamble, not a structure in the claim body.

KC Lim teaches "a liquid crystal through which the 0.3 THz wave propagates", where the frequency of 0.3 THz is in a range of sub-millimeter wave with 0.1-10 THz as disclosed in abstract of the instant application.

Lim et al. (US5184233A) disclose "FIG. 7 shows the birefringence phase shift change measured from rotating the magnetic field from parallel to perpendicular to the microwave polarization direction in the waveguide cell" (col. 7 lines 6-10). Therefore, the measurement of phase shift change must be continuous, thus phase shift is adjusted continuously from initial value to final value, so that the liquid crystal cell provides a continuously adjusting phase shift from initial value to final value.

Furthermore, the magnetic field with a magnitude 3KGauss and adjustable direction for rotating the magnetic field from parallel to perpendicular changes refraction index of liquid crystal cell and an equivalent optical path of the THZ wave (the underlined emphasis describes a inherent property of refractive phenomena: reflective or refractive behavior depending on optical path of the THZ wave).

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOAN C. NGUYEN whose telephone number is (571) 272-2296. The examiner can normally be reached on MONDAY-THURSDAY:8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOAN C. NGUYEN  
Examiner  
Art Unit 2871

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ANDREW SCHECHTER  
PRIMARY EXAMINER